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Kokai

OIL AND FAT COMPOSITION FOR FRYING
[Agemono choriyou yushi soseibutu]

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Claims /2*

1. An oil and fat composition for frying characterized by having 0.005-10 wt% of organic acid monoglyceride and 0.005-10 wt% of polyglycerol fatty acid ester dissolved in an edible oil or fat.

2. The oil and fat composition of Claim 1, wherein the organic acid monoglyceride has an HLB of 3 or higher.

3. The oil and fat composition of Claim 1 or 2, wherein the organic acid of the organic acid glyceride is citric acid.

4. The oil and fat composition of Claim 1, wherein the polyglycerol fatty acid ester has a glycerol polymerization degree of 6 or higher and HLB of 5 or higher.

5. The oil and fat composition of any one of Claims 1-4, wherein the transparent state at 0°C is sustained for at least 5.5 h.

Detailed explanation of the invention

[0001]

Industrial application field

This invention pertains to an oil and fat composition suitable for frying breaded fries, tempura, etc.

[0002]

Prior art

Edible oils and fats have been used in the past for frying tempura and breaded fries. Specific examples of liquid oils among them are rapeseed oil, soybean oil, corn oil, cottonseed oil, safflower oil, high oleic safflower oil, sunflower seed oil, high oleic sunflower seed oil, rice oil, etc., and as solid fats, there are

* [Numbers in right margin indicate pagination of the original text.]

palm oil, lard, etc. However, those previously used oils and fats have problems such as tempura batter blooming insufficiently, frequent oil splatter, difficulty keeping the just-fried texture of fries, insufficient oil drainage, high residual oil in prepared fries, etc.

[0003]

As attempts to solve those problems, the addition of sugar ester (sucrose fatty acid ester), diglyceride (fatty acid diglyceride) or lecithin to edible oils and fats has been proposed (Japanese Kokai Patent Application Nos. Hei 5[1993]-316950, Hei 5[1993]-316951, Hei 6[1994]-153794, Hei 7[1995]-109, Hei 7[1995]-16051, Hei 7[1995]-16052 and Hei 7[1995]-16053).

[0004]

However, the above means has the problem of poor sugar ester dissolution, leading to insufficient storage stability at low temperatures, and it is necessary to add 5-10% of an emulsifier such as diglyceride to maintain the storage stability at low temperatures causing another problem of low smoking point and consequent generation of an undesirable smell. In addition, for the sugar ester to exhibit a satisfactory effect, it is necessary to use a specific component of sugar ester (di or triester), and the compounding of such a specific component leads to increased costs for the oil and fat composition as the final product.

[0005]

Objective of the invention

The objective of this invention is to provide an oil and fat composition for frying, which shows functions of improving batter blooming at the time of frying, inhibiting oil splattering, improving oil draining from cooked fries, reducing the residual oil or fat in cooked fries, reducing oil consumption after

repeated use, sustaining crisp, just-fried batter texture and flavor, showing no opaque color formation or precipitate formation after storage at low temperature, etc., and solving various problems of frying in the prior art.

[0006]

Means to solve the problems

The present inventors conducted diligent studies to accomplish the above objective. As a result, they found that the addition and dissolution of specific amounts of organic acid glyceride and polyglycerol fatty acid ester to oils or fats was successful in providing an oil and fat composition having those functions described above, and they arrived at the this invention.

[0007]

Specifically, the gist of this invention is found in an oil and fat composition for frying characterized by having 0.005-10 wt% of organic acid monoglyceride, preferably with an HLB of 3 or higher, and 0.005-10 wt% of polyglycerol fatty acid ester, preferably with a polymerization degree of 6 or higher and HLB of 5 or higher, dissolved in an edible oil or fat so that its transparent state at 0°C can be sustained for 5.5 h.

[0008]

The oil and fat composition for frying of this invention is explained in detail as follows. The components comprising the oil and fat composition for frying of this invention are edible oil or fat, organic acid monoglyceride and polyglycerol fatty acid ester.

[0009]

As an edible oil or fat, there are liquid oils such as rapeseed oil, soybean oil, corn oil, cottonseed oil, safflower oil, high oleic safflower oil, sunflower seed oil, high oleic sunflower seed oil, rice oil, etc., and as solid fats, there are palm oil, lard, etc. These oils and fats may be used alone or as a mixture of optional proportions. Incidentally, to improve the desired effects of this invention, that is, batter blooming, oil draining, oil splattering prevention, texture and flavor of the batter of fries after standing, residual oil reduction in cooked fries, solubilities of organic monoglyceride and polyglycerol fatty acid ester, low-temperature storage, etc., ester-exchanged oils and fats are preferably used. Specific examples of oils or fats for this transesterification are the same edible oils and fats described above.

[0010]

As an organic monoglyceride, there are those prepared from organic acid, glycerol and fatty acid as basic raw materials by means of esterification. As an organic acid, there are, for example, citric acid, tartaric acid, succinic acid, acetic acid and lactic acid, used alone or as a mixture of 2 or more kinds, and as
a fatty acid, there are, for example, acetic acid, palmitic acid, stearic acid, oleic acid, linolic acid, linoleic acid, etc., used alone or as a mixture of 2 or more kinds. In this invention, it is preferable to use an organic
acid monoglyceride prepared with citric acid.

[0011]

As a polyglycerol fatty acid ester, it is possible to use fatty acid esters of polyglycerol such as /3
diglycerol, triglycerol, tetraglycerol, hexaglycerol, decaglycerol, etc., having a mean polymerization degree of 2-15, and specific examples of the fatty acid are fatty acids with 12-22 carbon atoms such as

lauric acid, myristic acid, palmitic acid, stearic acid, oleic acid, linolic acid, linoleic acid, etc., used alone or as a mixture of 2 or more kinds.

[0012]

The oil and fat composition for frying of this invention is prepared by dissolving the above organic acid monoglyceride and polyglycerol fatty acid ester in an edible oil or fat. To 100 wt% of edible oil or fat, 0.005-10 wt%, preferably 0.05-1 wt%, of organic acid monoglyceride and 0.005-10 wt%, preferably 0.05-1 wt%, of polyglycerol fatty acid ester are added. If the amount of either of the organic acid monoglyceride or polyglycerol fatty acid ester is less than 0.005 wt%, there is insufficient improvement of effects such as batter blooming, oil splattering inhibition, oil draining from fries and texture and flavor of fries after standing, and furthermore, a less pronounced effect of reducing the oil content in fries after cooking, achieving no satisfactory effect of this invention. Especially, if the amount of the organic acid monoglyceride is less than 0.005 wt%, the above effects are especially markedly reduced, and on the other hand, if the amount of polygyerol fatty acid ester is less than 0.005 wt%, those effects of this invention described above are not exhibited over the long term. Furthermore, if the content of either organic acid monoglyceride or polyglycerol fatty acid ester is over 10 wt%, they cannot be dissolved stably in edible oils or fats, causing a tendency to form precipitates at low temperatures.

[0013]

To improve the desired effects of this invention, that is, batter blooming, oil draining, oil splattering prevention, texture and flavor of batter of fries after standing, residual oil reduction in cooked fries, the HLB value of organic acid monoglyceride used is preferably 3 or higher, optimally in the range of 3-15, and in the case of polyglycerol fatty acid ester, the glycerol polymerization degree is 6 or higher, and the

HLB is 5 or higher, optimally, the polymerization degree is in the range of 6-10 and HLB is in the range of
5-13. If the above condition (HLB ≥ 3) for the organic acid monoglyceride is unsatisfied, the effects of this invention described above are insufficient, and if the above conditions (polymerization degree of ≥ 6, HLB ≥ 5) for the polyglycerol fatty acid ester are unsatisfied, the effects of this invention described above are not maintained over the long term.

[0014]

The oil and fat composition for frying of this invention is prepared by mixing the edible oil or fat, organic acid monoglyceride and polyglycerol fatty acid esters described above, and if necessary, heating to about 80°C while stirring to achieve dissolution to a homogeneously transparent state, and in a more desirable embodiment of this invention, the oil and fat composition prepared can sustain its transparent state at 0°C for 5.5 h. If those additives (organic acid monoglyceride and/or polyglycerol fatty acid ester) precipitate, there is no problem if the amount is only a trace, but there is a problem that the desired effects of this invention may be reduced.

[0015]

With respect to this point, the oil solubility and low-temperature storage stability are improved for the organic monoglyceride and polyglycerol fatty acid ester by adding a known emulsifier for food products such as glycerol fatty acid ester, polyglycerol fatty acid ester, sorbitan fatty acid ester, sucrose fatty acid ester, propylene glycol fatty acid ester, polyglycerol-condensed ricinolate, etc., used in a suitable amount concomitantly with the additives of this invention. Furthermore, 0.005-10 wt% of medium-chain fatty acid triglyceride may be added to 100 wt% of the edible oil or fat.

[0016]

Application examples

This invention will be explained in detail with the following application and comparative examples.

Application Examples 1-4 and Comparative Examples 1-4

As the organic acid monoglyceride, monoglyceride acetate with an HLB of 0.8 (Poem G-508: manufactured by Riken Vitamin K.K.) and monoglyceride citrate with an HLB of 9.5 (Sunsoft No. 621B, manufactured by Tiayo Chemical K.K.) were used as (a) and (b). Furthermore, the polyglycerol fatty acid ester (c) used was a product with a glycerol polymerization degree of 10 and HLB of 11 (SY Glystar SO-750, manufactured by Sakamoto Yakuhin Kogyo K.K.). The respective additives were added, in the proportions shown in Table 1, to 100 g of rapeseed salad oil (manufactured by Nisshin Oil Mills Ltd.), and
dissolved by stirring at 60°C to prepare oil samples.

[0017]

Cooking method for tempura fries

An electric fryer of 21 cm i.d. and 8 cm depth (HGP-106 manufactured by Toshiba) was filled with 700 g of a sample oil and heated to 180°C. 4 slices of sweet potato of about 4 cm diameter and about 1 cm thick were each coated with a tempura batter (100 g of wheat flour homogeneously dispersed in 170 cc of ice water) prepared in advance, then fried for 3 min in the above heated sample oil to obtain tempura fries.

[0018]

In the procedures described above, the batter blooming, oil splattering, oil draining, texture and flavor of batter in fries after cooling, amount of oil absorbed by batter, oil consumption at the time of cooking

and cold storage resistance were evaluated for the oil samples by using the following methods. The results
are shown in Table 2.

[0019]

(1) Batter blooming evaluation

Visual observation by 20 professional testers was carried out for prepared tempura fries. The number shown in the table is the average of grades given by the testers based on the standards of 1: excellent, 2: good, 3: fair, 4: poor.

[0020]

(2) Oil splattering evaluation

While frying tempura, a glass plate was horizontally placed at 15 cm from the oil surface. After cooking, the oil that adhered to the glass plate was extracted with diethyl ether to carry out quantitative determination of the oil. The number shown is a result relative to that of rapeseed oil alone set at 100.

[0021]

(3) Oil draining evaluation

The 4 fried slices of sweet potato were allowed to stand on a stainless steel net for about 20 sec and /4
placed on a sheet of homogenous paper for 10 min, allowing the paper to absorb the oil. The portion of the
paper with the oil adsorbed was cut out and weighed to determine the amount of oil absorbed. The results shown in the tables are relative to the amount of rapeseed oil used alone set at 100.

[0022]

(4) Evaluation of texture and flavor of batter after cooling

The fries were allowed to stand at 25°C for 1 h after frying and evaluated by 20 professional testers by comparison to equivalent fries within 5 min after frying as a reference. The number shown in the table is the average of the grades given by the testers, based on the standards of 1: same as immediately after frying, 2: slightly inferior to immediately after frying, 3: inferior to immediately after frying, 4: very inferior to immediately after frying.

[0023]

(5) Evaluation of amount of oil absorbed by batter of fries

The friend sweet potato slices were allowed to stand on a stainless steel net for about 20 sec, subsequently, the fried batter was peeled off, placed on a cylindrical paper filter and dried at 105°C in an isothermal dryer for 1 h. Subsequently, ethyl ether and Soxhlet extractor were used to carry out extraction, the extract was cooled in a desiccator for 30 min, and the weight was measured to determine the amount of oil. Furthermore, the amount of moisture was concomitantly measured with the measurement of the amount of oil by drying the peeled batter in an isothermal dryer at 105°C until the weight no longer changed to calculate the water content. The amount of oil absorbed by the batter was determined with formula (I) as follows.

[0024]

[Formula 1]

$$\text{Amount of oil absorbed (\%)} = \frac{\text{Solid content of tempura batter before frying)} \times \text{(oil in the batter after frying)}}{\text{(solid content of batter after frying)}} \quad \text{(I)}$$

[0025]

In this case, the solid content (wt%) of the tempura batter before frying is a value calculated from the tempura batter composition described above (37.04), and the solid content (wt%) of tempura batter after frying = 100 - (oil in the batter + water in the batter). The value shown in the table is a value relative to rapeseed oil used alone set at 100.

[0026]

(6) Evaluation of consumption of oil during cooking

The tempura cooking procedures were carried out 20 times with an interval of 30 min, and the amount of oil remaining in the fryer was measured. The number shown in the table is a result relative to the result of rapeseed oil used alone set at 100.

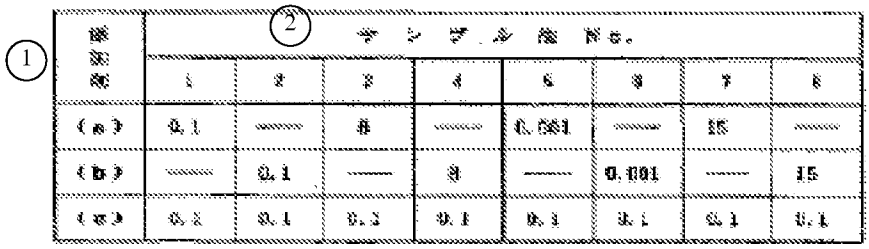
[0027]

(7) Cold storage resistance evaluation

100 g of an oil sample were placed in a glass sample bottle, the bottle was immersed in an ice water bath at 0°C for 5.5 h, and subsequently, the opacity or precipitation was evaluated. The result was evaluated according to the following grade: □clear, O: almost clear, X: opaque or precipitate formed.

[0028]

TABLE 1. Sample oil composition (unit: wt%)

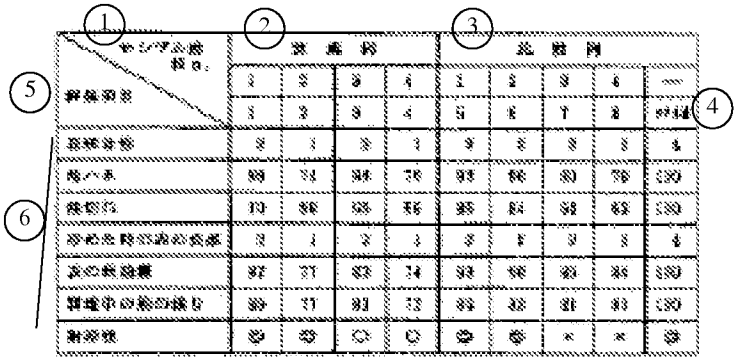


Key: 1 Additive

2 Sample No.

[0029]

TABLE 2. Evaluation of oil samples and fries



Key: 1 Sample oil no.

2 Application example

3 Comparative example

4 Rapeseed oil

5 Evaluation item

6 Batter blooming

Oil splattering

Oil draining

Texture and flavor after cooling

Amount of oil absorbed by batter

Oil consumption while cooking

Cold resistance

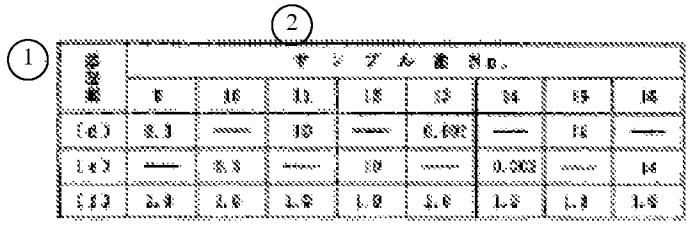
[0030] /5

Application Examples 5-8 and Comparative Examples 5-8

As the organic acid monoglyceride, monoglyceride acetate with an HLB of 0.8 (Poem G-508: manufactured by Riken Vitamin K.K.) and monoglyceride lactate with an HLB of 7.5 (Sunsoft No. 661AS, manufactured by Tiayo Chemical K.K.) were used as (d) and (e). Furthermore, the polyglycerol fatty acid ester (f) used was a product with a glycerol polymerization degree of 10 and HLB of 11 (SY Glystar SO-750, manufactured by Sakamoto Yakuhin Kogyo K.K.). The respective additives were added in the proportions shown in Table 3 to rapeseed salad oil, and dissolved by stirring at 60°C to prepare oil samples. The same cooking and evaluation methods as those used in Application Example 1 were carried out. The results obtained are shown in Table 4.

[0031]

TABLE 3. Sample oil composition (unit: wt%)

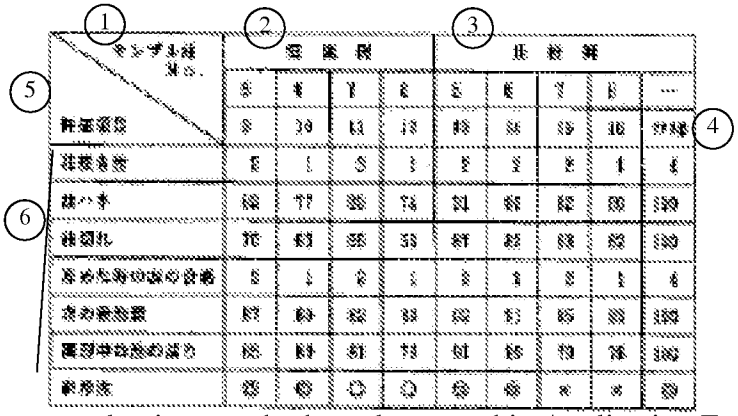


Key: 1 Additive

2 Sample No.

[0032]

TABLE 4. Evaluation of oil samples and fries



Note: Same evaluation standards as those used in Application Example 1

Key: 1 Sample oil no.

2 Application example

3 Comparative example

4 Rapeseed oil

5 Evaluation item

6 Batter blooming

Oil splattering

Oil draining

Texture and flavor after cooling

Amount of oil absorbed by batter

Oil consumption while cooking

Cold resistance

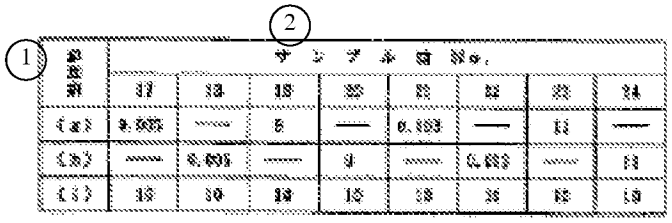
[0033]

Application Examples 9-12 and Comparative Examples 9-12

Polyglycerol fatty acid ester with a glycerol polymerization degree of 4 and HLB of 8 (SY Glystar MS-310, manufactured by Sakamoto Yakuhin Kogyo K.K.) and polyglycerol fatty acid ester with a glycerol polymerization degree of 6 and HLB of 7 (SY Glystar TS-500, manufactured by Sakamoto Yakuhin Kogyo K.K.) as (g) and (h) and monoglyceride diacetyltartrate with an HLB of 9.5 (Poem W-10, manufactured by Riken Vitamin K.K.) (i) were used, the respective additives were added in the proportions shown in Table 5 to rapeseed salad oil, and dissolved by stirring at 60°C to prepare oil samples. After 20 batches of the tempura cooking procedures of Application Example 1, the same evaluation methods as those used in Application Example 1 were carried out for the 20th batch cooked. The results obtained are shown in Table 6.

[0034]

TABLE 5. Sample oil composition (unit: wt%)

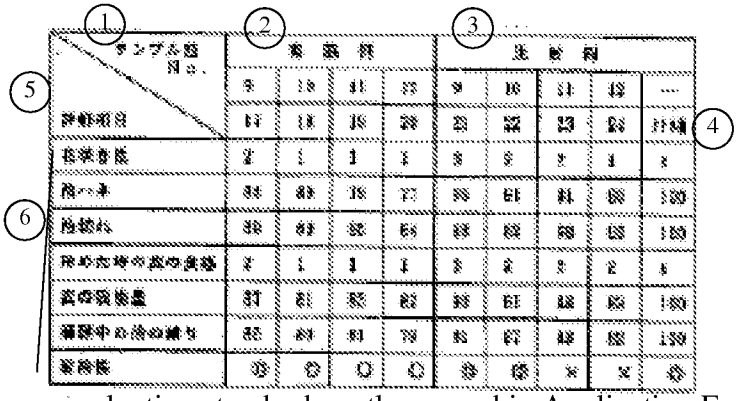


Key: 1 Additive

2 Sample No.

[0035]

TABLE 6. Evaluation of oil samples and fries /6



Note: Same evaluation standards as those used in Application Example 1

Key: 1 Sample oil no.

2 Application example

3 Comparative example

4 Rapeseed oil

5 Evaluation item

6 Batter blooming

Oil splattering

Oil draining

Texture and flavor after cooling

Amount of oil absorbed by batter

Oil consumption while cooking

Cold resistance

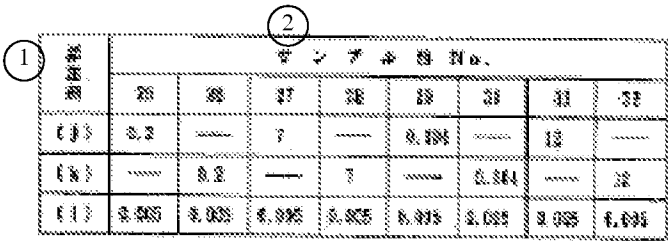
[0036]

Application Examples 13-16 and Comparative Examples 13-16

Polyglycerol fatty acid ester with a glycerol polymerization degree of 10 and HLB of 3 (SY Glystar DAS-750, manufactured by Sakamoto Yakuhin Kogyo K.K.) and polyglycerol fatty acid ester with a glycerol polymerization degree of 10 and HLB of 10 (SY Glystar TS-750, manufactured by Sakamoto Yakuhin Kogyo K.K.) as (j) and (k) and monoglyceride succinate with an HLB of 8.5 (Sunsoft No. 681NU, manufactured by Taiyo Kagaku K.K.) (l) were used, the respective additives were added in the proportions shown in Table 7 to rapeseed salad oil, and dissolved by stirring at 60°C to prepare oil samples. The same cooking and evaluation methods as those used in Application Example 9 were carried out. The results obtained are shown in Table 8.

[0037]

TABLE 7. Sample oil composition (unit: wt%)

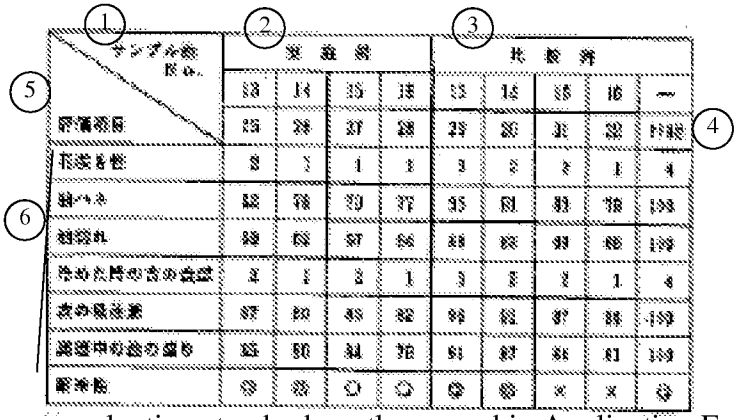


Key: 1 Additive

2 Sample No.

[0038]

TABLE 8. Evaluation of oil samples and fries



Note: Same evaluation standards as those used in Application Example 1

Key: 1 Sample oil no.

2 Application example

3 Comparative example

4 Rapeseed oil

5 Evaluation item

6 Batter blooming

Oil splattering

Oil draining

Texture and flavor after cooling

Amount of oil absorbed by batter

Oil consumption while cooking

Cold resistance

[0039]

Effect of the invention

The oil and fat composition for frying of this invention has excellent cold storage resistance, and when it is used in frying, the batter blooming is improved, the oil draining from the batter after frying is good, the texture and flavor of the batter of fries after cooling are improved, and the amount of oil absorbed by the batter is reduced. Therefore, the fries prepared taste good with good texture and flavor, and at the same time, the oil splattering during cooking is inhibited, reducing the contamination of the kitchen exhaust fan, the consumption of oil after repeated cooking is low, and it is effective for comfortable frying.